A Practical Stochastic Algorithm for Rendering Mirror-Like Flakes
Supplementary Document

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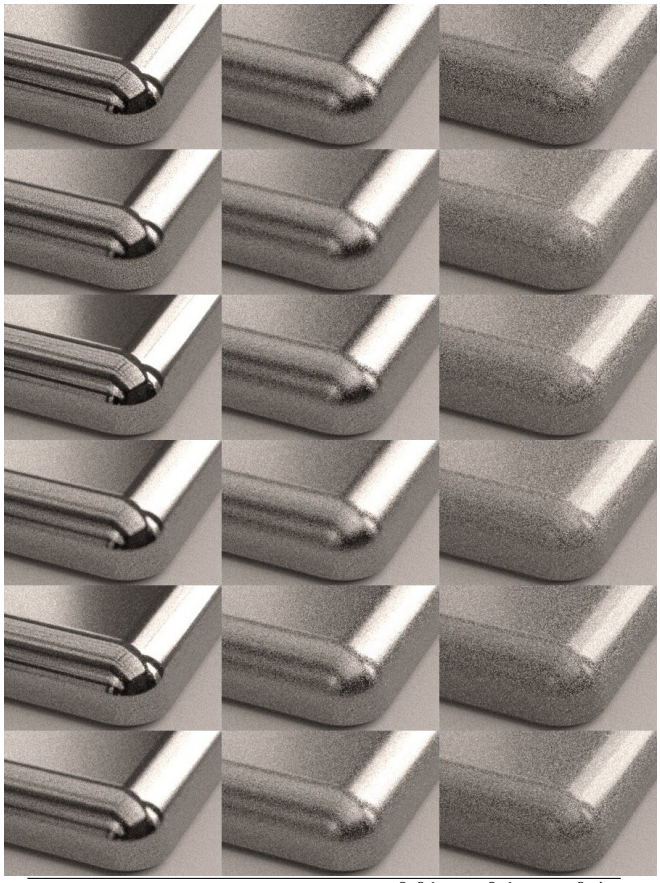

α	0.01	0.1	0.4
Jakob et al. (Beckmann, $\gamma = 1°$)	19s	631s	1945s
Jakob et al. (Beckmann, $\gamma = 5°$)	18s	49s	170s
Our method (Beckmann, $\gamma = 1°$)	4s	8s	10s
Our method (Beckmann, $\gamma = 5°$)	6s	8s	10s
Our method (GGX, $\gamma = 1°$)	5s	9s	9s
Our method (GGX, $\gamma = 5°$)	6s	9s	9s

Figure 1: *A comparison between Jakob et al. and our method for $N = 2 \times 10^7$ and distribution width α. Variance-based image sampler with a fixed threshold is used to render 200×300 region of the metal plate on Intel Core i7-980X, 3.33GHz, 6-core machine.*

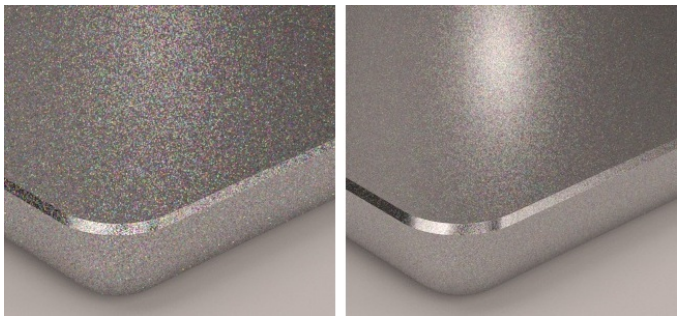

Figure 2: *Stochastic flakes material with flake colors, sampled from 64 element color table. The table is spanning hue from $0°$ to $360°$ for a fixed saturation=1 and lightness=0.5 in HSL color space. The corresponding parameters are 4×10^7 and $\alpha_{GGX} = 0.09$ (left image), and 16×10^7 and $\alpha_{GGX} = 0.04$ (right image).*

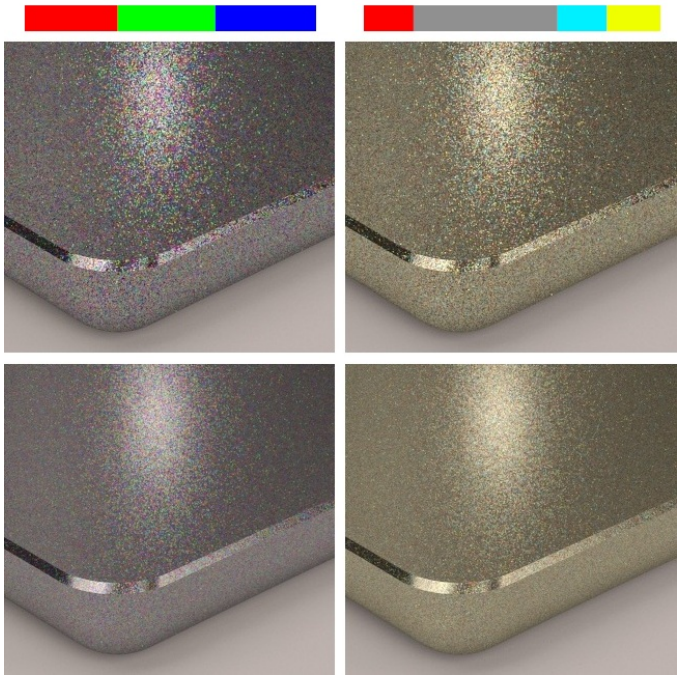

Figure 3: *Examples of flakes with random colors, sampled from two different color tables (top row). The corresponding images for $N = 2 \times 10^7$ (middle row) and $N = 8 \times 10^7$ (bottom row). Parameters $\gamma = 1°$, $\alpha_{GGX} = 0.04$ were used.*

Scene	α_{GGX}	N	γ	Time
Beetle toy (smooth)	0.09	-	-	203s
Beetle toy (flakes)	0.09	2.25×10^8	0.4°	270s
Sparkling snow (smooth)	0.25	-	-	52s
Sparkling snow (flakes)	0.25	10^8	0.4°	95s

Figure 4: *A comparison between the smooth BRDF and our stochastic flakes BRDF for the Beetle toy and Sparkling snow scenes. The images are rendered using variance-based image sampler with a fixed threshold in* 960×540 *resolution on Intel Core i7-980X, 3.33GHz, 6-core machine.*

Figure 5: *A photograph of sparkling snow (top) and sparkling snow material, comprised of sub-surface scattering base layer, stochastic flakes material coat and a bump map for the fine surface detail (bottom). The flakes material has* $\gamma = 3^\circ$ *and GGX microfacet distribution with a very high width parameter* $\alpha_{GGX} = 0.64$.